PERIODICAL
118(3536)
118(35

Proceedings of the United States National Museum

SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

LIBRARY
APR 12 1967
FISH & WILDLIFE SERVICE

Number 3536 1966 Volume 118, Pages 622–662

DECAPOD CRUSTACEANS FROM ST. HELENA ISLAND, SOUTH ATLANTIC

By FENNER A. CHACE, JR.

SMITHSONIAN PRESS

Proceedings of
the United States
National Museum

SMITHSONIAN INSTITUTION • WASHINGTON, D.C.

Volume 118 1966 Number 3536

DECAPOD CRUSTACEANS FROM ST. HELENA ISLAND, SOUTH ATLANTIC

By Fenner A. Chace, Jr.
Senior Scientist, Department of Invertebrate Zoology

Introduction

As the site of Napoleon's last imprisonment and death, St. Helena is one of the best known solitary islands in the world, but much of its marine fauna has not been accorded the attention that it deserves. The island is an isolated volcanic peak 10½ miles long and 6½ miles wide, situated slightly east of the mid-Atlantic Ridge at latitude 15°58′ S. and longitude 5°43′ W. The nearest point of exposed land is Ascension Island, about 800 miles to the northwest; southern Angola, roughly 1,200 miles to the east, is the closest point on the coast of West Africa, and Recife, Brazil, approximately 2,000 miles to the west-northwest, is the nearest South American shore. That St. Helena is reasonably old and has long been isolated is suggested by its numerous endemic fishes (Cunningham, 1910, and Cadenat and Marchal, 1963), mollusks (E. A. Smith, 1890), and echinoderms (Mortensen, 1933).

Although considerable marine collecting has been done at St. Helena by Melliss, Cunningham, Mortensen, Colman, and the *Reine-*

Pokou (see Cadenat and Marchal), none of those collections, except the fishes and echinoderms, have been studied extensively. Melliss (1875) recorded the following six decapod crustaceans: *Palaemon forceps* (?=*Brachycarpus biunguiculatus*); *Palinurus*, species ? (= ?*Panulirus echinatus*); *Scyllarus latus* (=*Scyllarides herklotsii*); *Pagurus bernhardus* (?=*Dardanus imperator*); *Dromia vulgaris* (=*D. erythropus*); and *Varuna atlantica* (?=*Planes cyaneus*).

Miers (1880) added *Enoplometopus dentatus* (?=*E. antillensis*) and (1881) described the apparently endemic *Pagurus imperator* (=*Dardanus imperator*).

Cunningham (1910) brought the list of known decapods to 11 with the following additions: *Pagurus arrosor* (=*Dardanus arrosor*); *Grapsus grapsus*; and *Plagusia depressa*.

A twelfth species, *Albunea guerinii* (=*A. carabus*), was cited by Stebbing (1914).

The present study was based on collections of 584 specimens received between 1958 and 1964 from Arthur Loveridge, formerly curator of herpetology at the Museum of Comparative Zoology, Harvard University, and now a resident of St. Helena. These specimens presumably represent all but 3 of the decapods previously known from the island plus 11 additional species—3 of them apparently undescribed. A major part of these collections was made by Mr. Loveridge, at considerable personal discomfort, from a buoy and its attached cable anchored in 75 meters off Rupert's Bay. The opportunity to sample this interesting assemblage of organisms was afforded once each year when the buoy was replaced; the cable was renewed every other year. The remainder of the collections was made at the few narrow breaks in the precipitous cliffs of the island where shore collecting is possible, or they were obtained from fishermen and visiting skindivers.

The Loveridge collections contain one species not included in the following systematic account, a spiny lobster represented by the dried skeleton of an abdomen found on the beach at Sandy Bay on December 22, 1959. Following my failure to identify these fragments, L. B. Holthuis pointed out their obvious similarity to the abdomen of *Panulirus homarus* (Linnaeus, 1758). As that species is reasonably common on the coast of South Africa, the fragments found at Sandy Bay might have been washed ashore from a passing ship, or they might have originated in a shipment of frozen lobster tails imported to St. Helena from South Africa. There is no reason to believe that the species belongs to the local fauna.

The three species previously recorded from St. Helena but not represented in the Loveridge collections have been included in the systematic account, in order to make the faunal list as complete as

possible at this time. As some of the records cited were published in reports that are not directly concerned with the fauna of St. Helena, however, there is a very real possibility that similar records in other papers, even of species not mentioned here, have escaped my notice.[1] The references listed for each species include the original description, all St. Helena records that have come to my attention, a good figure, and synonyms here proposed for the first time; there has been no attempt to indicate all synonyms.

Most of these collections, including holotypes of the new species, have been retained in the national collections. Available duplicate specimens, including paratypes, have been deposited in the Museum of Comparative Zoology at Harvard and in the British Museum (Natural History).

I take this opportunity to express my sincere gratitude to Mr. Loveridge for making this material available to me and for enthusiastically fulfilling my several requests for specific collections. Special thanks are also due to L. B. Holthuis of the Rijksmuseum van Natuurlijke Historie, Leiden, and to J. Forest of the Muséum National d'Histoire Naturelle, Paris, who graciously examined material in their collections at my request. Among my Smithsonian colleagues, Raymond B. Manning has been especially helpful in calling my attention to St. Helena records in the literature and in reviewing the manuscript of this report.

Family Palaemonidae

Subfamily Palaemoninae

Brachycarpus biunguiculatus (Lucas)

Palaemon biunguiculatus Lucas, 1849, p. 45, pl. 4, fig. 4.
?*Palaemon forceps*.—Melliss, 1875, p. 204.
Brachycarpus biunguiculatus.—Holthuis, 1952a, p. 3, pl. 1.

Material: Off Rupert's Bay; buoy; 0–2 meters; Feb. 2, 1959; 1 female.—James Bay; Sept. 7, 1959; 2 males, 1 ovigerous female.—Off Rupert's Bay; buoy and cable; 0–75 meters; Mar. 18, 1960; 3 males, 1 ovigerous female.—James Bay; collected by skindiver; April 1964; 10 females (5 ovigerous).

Measurements: Carapace lengths of males to posterior orbital margin, 4.8–11.2 mm.; of females without eggs, 4.0–7.7 mm.; of ovigerous females, 5.0–11.2 mm.

---

[1] A glaring omission, brought to my attention after completion of this study, is that of *Pseudozius bouvieri* (A. Milne-Edwards, 1869). This crab was figured, but not identified, by Melliss, 1875, p. 206, pl. 22, fig. 3 (see Monod, 1956, p. 239, and Forest and Guinot, 1966, p. 68, for synonymy and distribution).

Remarks: As noted by Holthuis (1952a, p. 8), the number of fused articles in the inner antennular flagellum varies with growth. In the St. Helena material, it increases rather regularly from 5 or 6 at a carapace length of 4.0 mm. to 13 at a carapace length of 11.2 mm.

Distribution: Probably pantropical, littoral and sublittoral. The St. Helena specimens identified by Bate and recorded by Melliss (1875) as *Palaemon forceps* almost certainly belong to this species.

Subfamily Pontoniinae

Pontonia pinnophylax (Otto)

FIGURE 1

Palaemon pinnophylax Otto, 1821, p. 12.
Pontonia tyrrhena.—Schmitt, 1926, p. 40, fig. 66.

Material: James Bay; in *Pinna rudis;* Feb. 7, 1964; 1 male, 1 ovigerous female.

Measurements: Carapace length of male to posterior margin of orbit, 11.6 mm.; of ovigerous female, 13.1 mm.

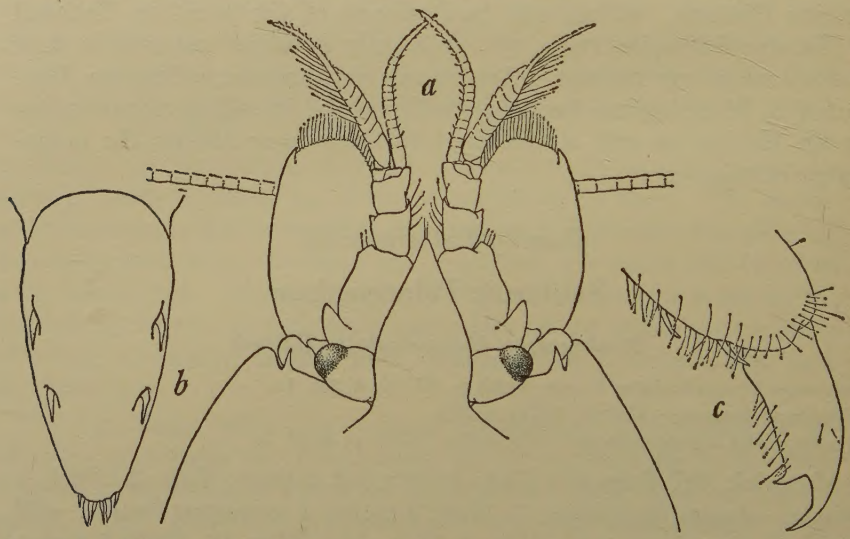


FIGURE 1.—*Pontonia pinnophylax*, male from James Bay: *a*, anterior part in dorsal view; *b*, telson; *c*, dactyl of right third pereiopod.

Remarks: The rostrum (fig. 1*a*) of each of these specimens is slightly broader and more distinctly cordiform than it is in any of the five Mediterranean and West African specimens available for comparison. Also, the dactyls of the last three pereiopods of the St. Helena specimens have the distal tooth somewhat more strongly curved (fig. 1*c*). Both of these characters are variable, however, and the present specimens probably fall within the limits of variation of *P. pinnophylax.*

Distribution: Mediterranean Sea; West Africa as far south as northern Angola; Azores; St. Helena (new record). Commensal in bivalve mollusks of the genus *Pinna*.

Family Alpheidae

Alpheus macrocheles (Hailstone)

FIGURE 2

Hippolyte macrocheles Hailstone, 1835, p. 395.
Alpheus macrocheles.—Holthuis, 1951, p. 69.

Material: Off Rupert's Bay; buoy; 0–2 meters; Feb. 11, 1963; 1 ovigerous female.—James Bay; collected by skindiver; April 1964; 1 ovigerous female.

Measurements: Carapace lengths to base of rostrum, 5.1 and 7.2 mm.

Remarks: The smaller specimen bears only two or three eggs, suggesting that it is a very young adult. In the proportions of the antennular peduncle and last three pereiopods and in the length of the distal spine on the attenal scale, the larger specimen resembles two much larger British specimens of *A. macrocheles* available for comparison more closely than does the smaller one, but the detached minor chela associated with the larger St. Helena specimen is much slenderer and has a more pronounced dorsal notch than noted in the British specimens. Comparison of this appendage with those of typical specimens of *A. macrocheles* of similar size would be desirable.

Distribution: The recorded range of *A. macrocheles* extends from the south coast of England to the Cape Verde Islands and Guinea, including the Mediterranean, usually in depths of from 20 to more than 100 meters. The western Atlantic records of this species in Rathbun (1901) and Schmitt (1935) are based on fragmentary specimens and require verification.

Alpheus paragracilis Coutière

Alpheus paragracilis Coutière, 1897, p. 304; 1905, p. 883, pl. 76, figs. 22–22g.
Crangon paragracilis.—Banner, 1953, p. 96, fig. 33.

Material: Off Rupert's Bay; buoy cable; 0–75 meters; Jan. 17, 1958; 2 females.—Same; Mar. 18, 1960; 1 female with two major chelae.—Same; Apr. 5, 1962; 1 male.—James Bay; collected by skindiver; April 1964; 1 ovigerous female.

Measurement: Carapace length of male to base of rostrum, 4.4 mm.; of females without eggs, 4.3–5.2 mm.; of ovigerous female, 5.9 mm.

Remarks: Although this species has not been recorded from the Atlantic heretofore, no differences could be found between the St. Helena specimens and material of *A. paragracilis* from the Hawaiian Islands, with which they were compared.

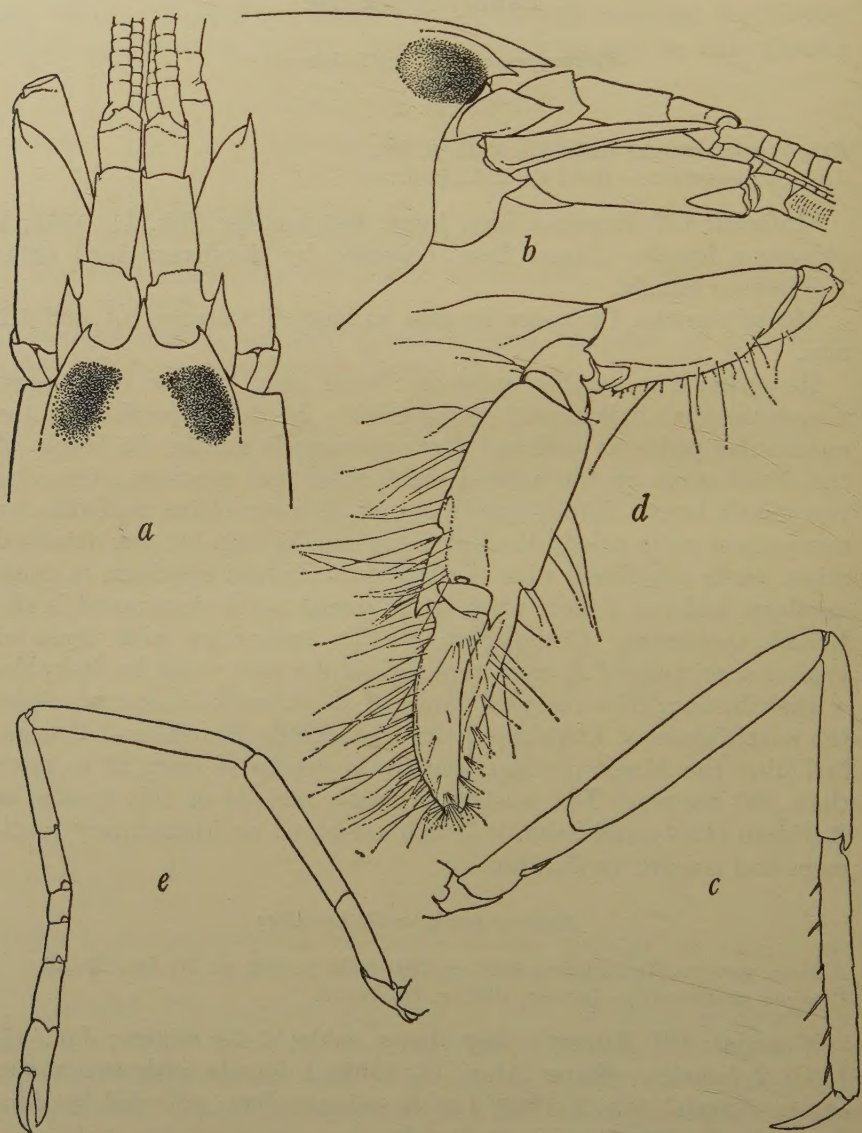


FIGURE 2.—*Alpheus macrocheles:* *a*, anterior part of smaller ovigerous specimen in dorsal view; *b*, same in lateral view; *c*, right third pereiopod of same specimen; *d*, minor cheliped associated with larger ovigerous female; *e*, left second pereiopod of larger specimen.

Distribution: Indo-Pacific region from the Red Sea and Madagascar to the Hawaiian Islands, littoral and sublittoral; St. Helena (new Atlantic record).

Synalpheus fritzmuelleri Coutière

Synalpheus fritzmülleri Coutière, 1909, p. 35, fig. 18.

Material: Off Rupert's Bay; buoy cable; 0–75 meters; Jan. 17, 1958; 1 male, 5 females (4 ovigerous).—Same; buoy; 0–2 meters; Feb. 2, 1959; 1 male, 2 ovigerous females.—Same; buoy and cable; 0–75 meters; Mar. 18, 1960; 5 males, 20 females (11 ovigerous), 1 mutilated specimen.—Same; Apr. 5, 1962; 3 ovigerous females.—Same; buoy; 0–2 meters; Feb. 11, 1963; 2 females.—James Bay; collected by skindiver; April 1964; 1 male, 14 females (11 ovigerous).

Measurements: Carapace lengths of males to base of rostrum, 3.2–6.1 mm.; of females without eggs, 3.4–8.8 mm.; of ovigerous females, 4.8–8.8 mm.

Remarks: The St. Helena material agrees very well with the syntype series of *S. fritzmuelleri,* with which it has been compared. Two or three of the specimens are of the "oxyceros" form called *S. fritzmuelleri elongatus* by Coutière (1909), but most of them are of the typical form.

As in *S. senegambiensis* (see Holthuis, 1951, p. 93), the males lack both an appendix masculina and an appendix interna on the endopod of the second pleopod. In some of the specimens identified as females, however, the appendix interna is so slender that it is distinguishable only with difficulty from the setae fringing the endopod.

Distribution: St. Helena (new record); western Atlantic from North Carolina and Bermuda to Santa Catarina, Brazil; Baja California. Littoral to more than 50 meters. The record of this species from Greenland waters (Stephensen, 1950) is very questionable.

Family Palinuridae

Panulirus echinatus Smith

Figures 3, 4; Plates 1, 2

Panulirus echinatus Smith, 1869, p. 20.—Holthuis, 1961, p. 223, fig. 1a.
Palinurus species?—Melliss, 1875, p. 204.
Panulirus guttatus.—Cunningham, 1910, p. 120.
Palinurus guttatus.—Colman, 1946, p. 277.

Material: James Bay; Jan. 29, 1964; 1 ovigerous female.

Measurements: Carapace length in midline, 101 mm.

Remarks: The uninterrupted transverse grooves on all but the first abdominal somites of this specimen caused me to believe at first that it represented an undescribed, possibly endemic species. The subsequent discovery in the national collections of a large male from

the Cape Verde Islands, with similarly complete abdominal grooves, led to correspondence with J. Forest at the Muséum National d'Histoire Naturelle in Paris and the disclosure that Cape Verde specimens of *P. echinatus* are variable in this regard. The somewhat larger light spots on the abdomen of the St. Helena specimen and the broader light stripes on the legs may eventually prove to be of sub-

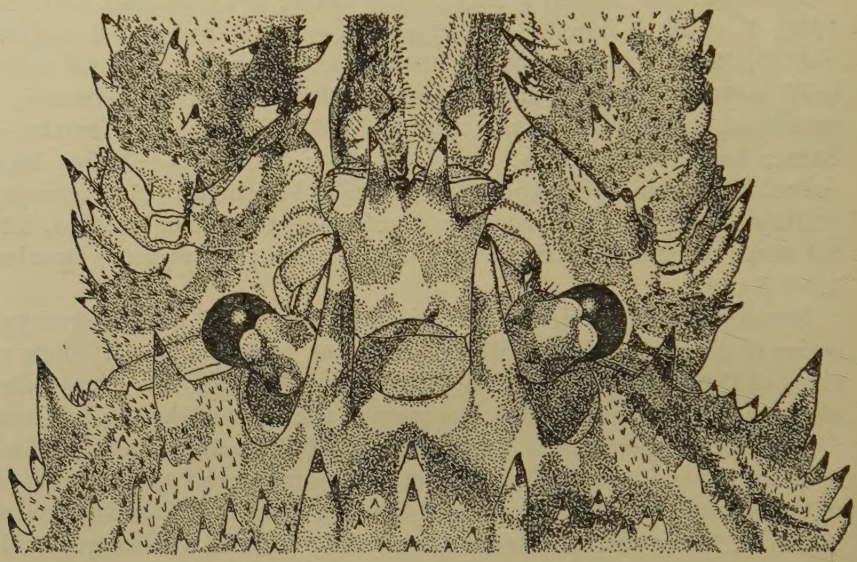


FIGURE 3.—*Panulirus echinatus*, frontal region of ovigerous female from James Bay.

specific significance, but that conclusion must await the study of series of *P. echinatus* from various parts of its range.

The species is known at St. Helena as the "long-legs," where it is of some local commercial importance, but it is not taken as frequently as the "stump" (*Scyllarides herklotsii*).

Distribution: Cape Verde Islands; St. Peter and St. Paul Rocks; St. Helena; Brazil. Sublittoral.

Family Scyllaridae

Scyllarides herklotsii (Herklots)

FIGURE 5

Scyllarus Herklotsii Herklots, 1851, p. 14, pl. 2, figs. 14, 15.
Scyllarus latus.—Melliss, 1875, p. 203.—Cunningham, 1910, p. 119.—Colman, 1946, pp. 275, 277.
?*Scyllarides elisabethae*.—Stebbing, 1914, pp. 255, 282.
Scyllarides herklotsi.—Holthuis, 1952b, p. 23, fig. 6.

Material: Off Rupert's Bay; buoy; 0–2 meters; Feb. 2, 1959; 1 postlarva (pseudibacus stage).—James Bay; fish market; December

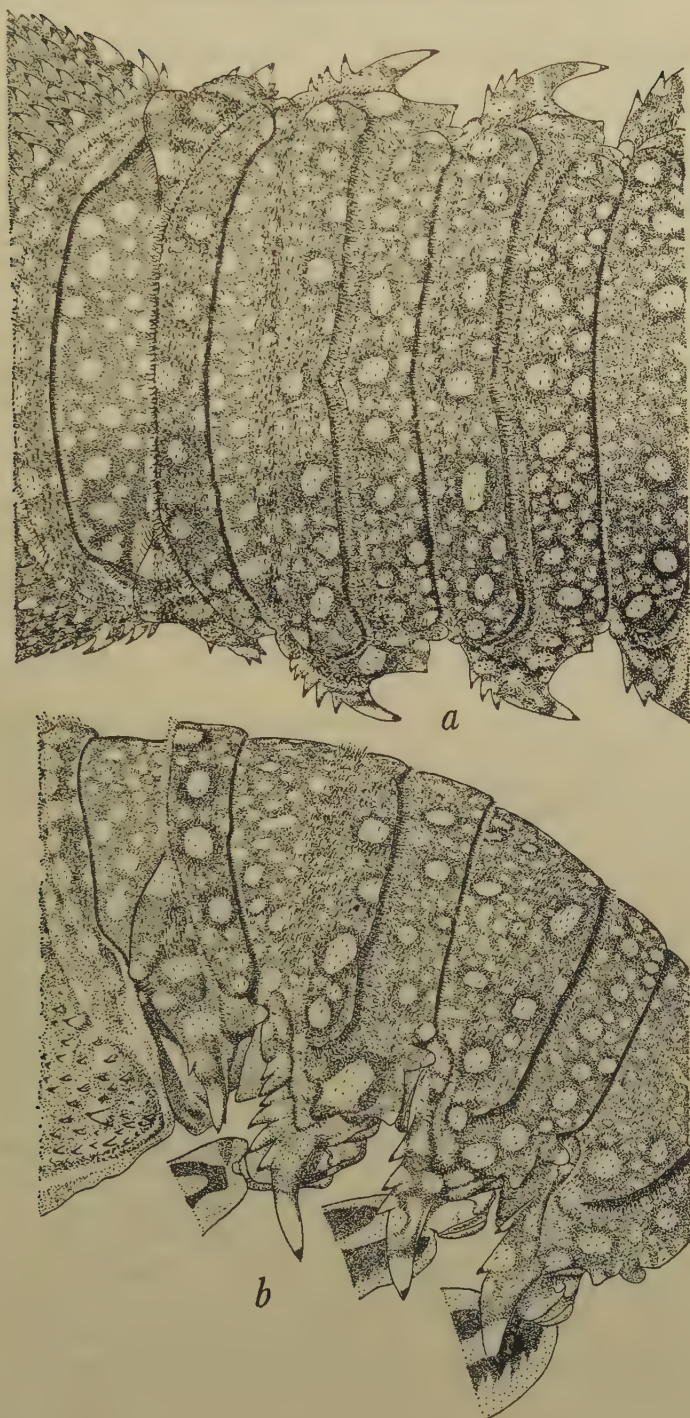


FIGURE 4.—*Panulirus echinatus*, first three abdominal somites of ovigerous female from James Bay: *a*, dorsal view; *b*, lateral view.

1960; 1 dried female.—James Bay, Jamestown Jetty; Feb. 1, 1962; 2 dried males.

Measurements: Carapace lengths of males to midpoint of imaginary line joining inner orbital angles, 77 and 94 mm.; of female, 100 mm.; of postlarva, 15 mm.

Remarks: This species, known on St. Helena as the "stump," supports a local fishery (see Cunningham and Colman references).

There has been no opportunity to compare these specimens with West African material, but they differ from the Mediterranean *Scyllarides latus* in the characters noted by Holthuis (1952b). Stebbing's record of *S. elisabethae* from "Off St. Helena harbour, between 45 and 55 fathoms; June 2, 1904" is puzzling. It seems unlikely that a person of Stebbing's ability and experience would confuse *S. herklotsii* (which has subrectangular anterolateral angles and a shallow notch in the lateral margin of the carapace) with the South African species (which apparently has acute and outstanding anterolateral angles and correspondingly pronounced indentations behind them). I considered the chance that "St. Helena harbour" might refer to Saint Helena Bay, South Africa, but the fact that the date corresponds with that of collections of *Albunea* and *Grapsus* from James Bay, St. Helena Island, seems to rule out that possibility.

Although it has been well established that the species assigned to the genus *Pseudibacus* are postlarvae of *Scyllarides* (see Bouvier, 1917, p. 101), these stages are not yet well known, and their identity with the respective adult forms remains to be verified in most cases. I have therefore illustrated the pseudibacus stage (fig. 5) found on the buoy off Rupert's Bay. This specimen was evidently about to metamorphose when collected. It agrees with the rather brief description of the Mediterranean *Pseudibacus veranyi* Guérin-Méneville, 1855 (which is almost certainly the postlarva of *Scyllarides latus*), but there is little similarity between the St. Helena example and Guérin-Méneville's obviously inaccurate figure. Both *Pseudibacus gerstaeckeri* Pfeffer, 1881, from the western South Atlantic [which Bouvier tentatively assigned to *Scyllarides aequinoctialis* (Lund)], and *P. pfefferi* Miers, 1882, from Mauritius [which may be the postlarva of *S. squamosus* (H. Milne Edwards)], seem to differ from the St. Helena specimen in having a distinct median carina on the carapace. In the postlarva figured by Barnard (1950, p. 559, figs. 104g–k), the anterolateral angles are more outstanding, as might be expected of *S. elisabethae*. Probably direct comparison of the pseudibacus stages of *S. latus* and *S. herklotsii* will be necessary to determine whether there is postlarval evidence to support the belief that the two forms are specifically distinct.

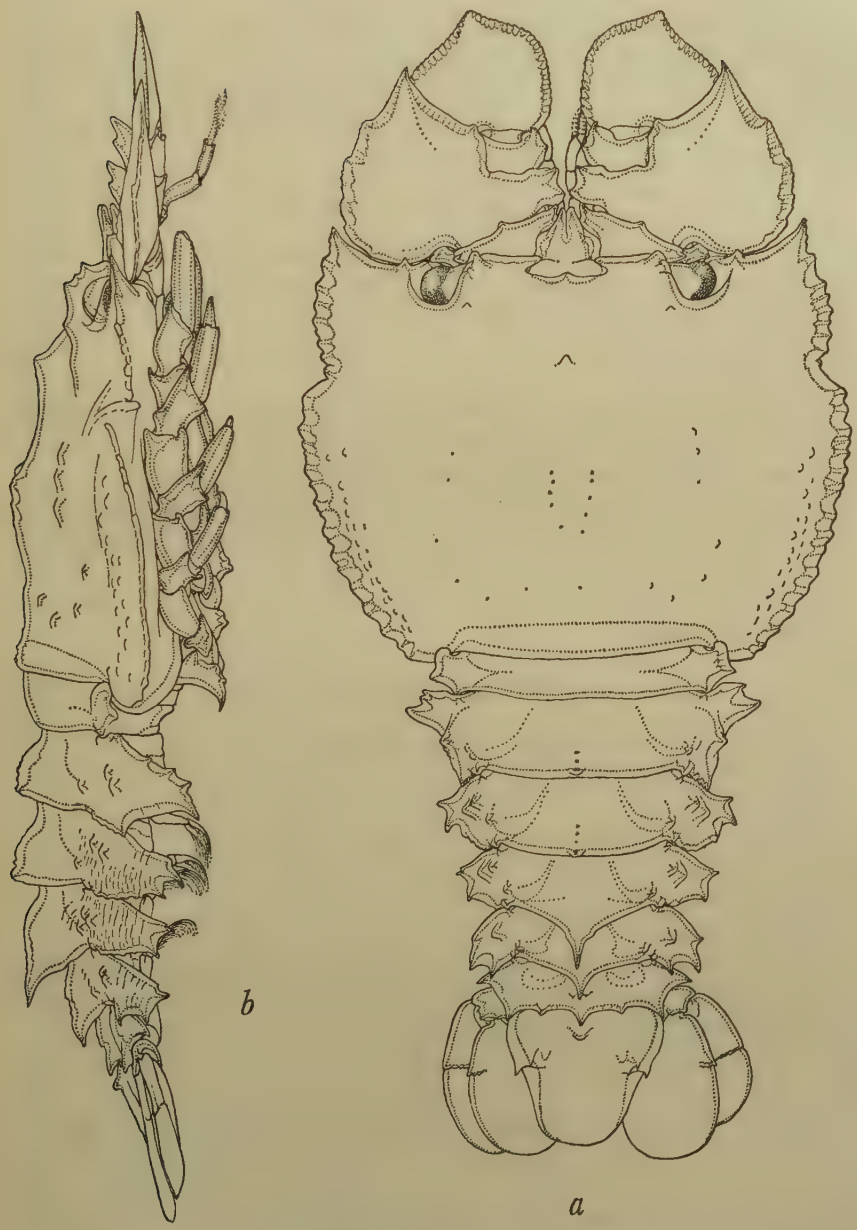


FIGURE 5.—*Scyllarides herklotsii*, pseudibacus stage from Rupert's Bay buoy: *a*, dorsal view; *b*, lateral view.

Distribution: *S. herklotsii* has been recorded previously from only three specimens, two from Ghana and one from the Congo. Presumably, however, the St. Helena material referred to *S. latus* by Melliss, Cunningham, and Colman belongs to this species. It apparently occurs in depths of 25 to 70 meters.

Family Nephropidae

Enoplometopus antillensis Lütken

Enoplometopus antillensis Lütken, 1865, p. 265.—Holthuis, 1946, p. 79, pl. 5, figs. b, d, e, g, h, j, k, l; pl. 6, figs. a–e; pl. 7, figs. a, b.
Enoplometopus dentatus Miers, 1880, p. 381, pl. 15, fig. 7.

Material: None.

Remarks: *Enoplometopus dentatus* was described from a mutilated, poorly preserved specimen collected at St. Helena by J. C. Melliss. Holthuis (1946) suggested, with considerable justification but without reexamination of Miers' type-specimen, that *E. dentatus* is a synonym of *E. antillensis*, a species described from a West Indian specimen and subsequently discovered in the Indonesian region.

Distribution: West Indies; Banda Island, Moluccas; St. Helena. Probably sublittoral.

Family Paguridae

Subfamily Dardaninae

Dardanus arrosor (Herbst)

Cancer arrosor Herbst, 1796, p. 170, pl. 43, fig. 1.
Pagurus arrosor.—Cunningham, 1910, p. 121.
Dardanus arrosor.—Forest, 1955, p. 90, fig. 19.

Material: None.

Remarks: Although there is no reason to doubt Calman's identification of the specimens collected and reported by Cunningham (1910), that material should eventually be reexamined in the light of knowledge about this and related species that has accumulated since that date.

Distribution: Eastern Atlantic, Mediterranean, Red Sea, Philippines, Japan, and New Zealand, in depths of 20 to 300 meters.

Dardanus imperator (Miers)

?*Pagurus bernhardus*.—Melliss, 1875, p. 203.
Pagurus imperator Miers, 1881, p. 275.—Cunningham, 1910, p. 120, fig. 6.
Dardanus imperator.—Forest, 1955, p. 90.

Material: James Bay, West Rocks; Dec. 21, 1959; 1 juvenile.

Measurements: Total length of carapace in midline, 4.8 mm.; length of anterior portion of carapace, 2.6 mm.

Remarks: This immature specimen differs from Miers' description of *D. imperator* in a few characters. The frontal margin is deeply sinuous, rather than "nearly straight," and it is armed with a slender spine directed anterolaterally just lateral to the base of each eyestalk. The ocular scales each terminate in two divergent spines (the outer one slightly stouter than the inner) rather than being "denticulated on their outer margins." Also, there are no calcareous plates on the anterior abdominal somites. These differences may be merely characteristic of subadult individuals.

Distribution: Known only from St. Helena, to a depth of at least 25 meters.

Family Albuneidae

Albunea carabus (Linnaeus)

Cancer Carabus Linnaeus, 1758, p. 632.
Albunea guerinii.—Stebbing, 1914, pp. 255, 281.
Albunea carabus.—Monod, 1956, p. 40, figs. 10–14.

Material: None.

Remarks: There is nothing in Stebbing's remarks about the specimen collected by the *Scotia* at "James Bay, St. Helena, June 2, 1904; Station 499" to suggest that it is other than *A. carabus*, but reexamination of the specimen would be desirable because of the information that has been gained about the species of *Albunea* during the past 50 years.

Distribution: Mediterranean; West Africa as far south as Ghana; St. Helena. Sublittoral.

Family Dromiidae

Dromia erythropus (George Edwards)

FIGURE 6

Cancer erythropus George Edwards, 1771.
Dromia lator H. Milne Edwards, 1837, p. 174.
Dromia vulgaris.—Melliss, 1875, p. 203.—Cunningham, 1910, p. 122.
Dromia erythropus.—Rathbun, 1937, p. 31, fig. 11, pl. 6, figs. 1, 2.
Dromia species?—Colman, 1946, p. 277.

Material: Off Rupert's Bay; buoy and cable; 0–75 meters; Mar. 18, 1960; 1 young female.—Off Jamestown; collected by fisherman; 1 dried male, 1 dried female.—James Bay; collected by skindiver; February 1964; 1 male, 1 female.

Measurements: Carapace lengths of males in midline, 62.8 and 67.1; of females, 14.6–57.2 mm.

Remarks: The four adult specimens agree with western Atlantic material with which they have been compared and disagree with specimens of *D. personata* (Linnaeus, 1758) [=*D. vulgaris* H. Milne Edwards, 1837, see Holthuis and Gottlieb, 1958, p. 78] in the more evenly convex carapace and the more prominent suborbital tooth mentioned by Milne Edwards. The two adult males and one of the adult females differ from all western Atlantic adults at my disposal, however, in having the third anterolateral tooth (not counting the

FIGURE 6.—*Dromia erythropus*, outline of denuded carapace of male from off Jamestown.

orbital angle) placed so close to the second tooth as to form almost a single bifid tooth (compare fig. 6 with Rathbun 1937, fig. 11). Evaluation of the systematic importance of this character must await the examination of additional specimens. The immature specimen lacks the third anterolateral tooth entirely, but it differs little in this respect from western Atlantic specimens of *D. erythropus* of comparable size.

Distribution: Florida to Brazil; Bermuda; St. Helena. Sublittoral to 360 meters.

Family Calappidae

Subfamily Calappinae

Calappa gallus (Herbst)

Cancer gallus Herbst, 1803, pp. 18, 46, pl. 58, fig. 1.
Calappa gallus.—Monod, 1956, p. 100, figs. 115, 116.

Material: No exact locality; November 1963; 1 female.

Measurements: Carapace length in midline, 49.2 mm.

Distribution: Western Atlantic from Florida to Brazil; Bermuda; St. Helena (new record); eastern Atlantic from Senegal to Angola; Indo-Pacific region from East Africa (Red Sea to Port Shepstone, South Africa) to Hawaii. Sublittoral to 218 meters.

Family Xanthidae

Actaea margaritaria A. Milne-Edwards

Actaea margaritaria A. Milne-Edwards, 1867, p. 41, pl. 21 bis, figs. 3–6.—Odhner, 1925, p. 47, pl. 3, fig. 8.
Actaea (*Actaea*) *margaritaria*.—Monod, 1956, p. 294, figs. 357–360.

Material: Off Rupert's Bay; buoy; 0–2 meters; Feb. 2, 1959; 1 male, 1 female.—Same; buoy and cable; 0–75 meters; Mar. 18, 1960; 1 male, 4 females.—Same; Apr. 5, 1962; 1 female.—Same; buoy; 0–2 meters; Feb. 11, 1963; 3 females.—James Bay; collected by skin-diver; April 1964; 2 males, 2 females (1 ovigerous).

Measurements: Carapace lengths of males, 3.1–5.3 mm.; of females without eggs, 3.2–7.3 mm.; of ovigerous female, 8.7 mm.

Remarks: The smallest male and six of the eleven females (with carapaces less than 5 mm. long) are evidently immature.

The male gonopods of this species resemble those of *A. ruppellii* (Krauss, 1843) from South Africa and the Indo-Pacific region, but I cannot accept Odhner's suggestion that *A. margaritaria* may be only subspecifically distinct from that species. Not only does *A. ruppellii* attain a much greater size than has been recorded for *A. margaritaria*, but it is a much hairier crab, and the dark color of the fixed finger extends over somewhat less of the surface of the male chela than it does in the Atlantic species.

Distribution: Off West Africa from the Cape Verde Islands to Annobon; St. Helena (new record). Sublittoral to 100 meters.

Micropanope melanodactylus (A. Milne-Edwards)

FIGURE 7

Xanthodes melanodactylus A. Milne-Edwards, 1867, p. 39, pl. 21 bis, figs. 1, 2.
Micropanope polita Rathbun, 1893, p. 238.—Garth, 1946, p. 459, pl. 77, fig. 4.
Panopeus tanneri Faxon, 1893, p. 154.
Micropanope melanodactyla.—Monod, 1956, p. 320, figs. 401–405.

Material: Off Rupert's Bay; buoy cable; 0–75 meters; Apr. 5, 1962; 1 male.—Same; buoy; 0–2 meters; Feb. 11, 1963; 2 males.

Measurements: All three specimens have carapace lengths of 4.0 mm.

Remarks: Comparison of homeotypes of *Xanthodes melanodactylus* from the Cape Verde Islands with syntypes of *Micropanope polita* Rathbun from the eastern Pacific off Baja California and a syntype of *Panopeus tanneri* Faxon from near Cocos Island has disclosed no apparently significant differences in the form of the gonopods (fig. 7) or in any other characters that cannot be referred to normal variation in this variable species. Garth (1946, p. 462) noted that the 800

specimens examined by him from the Galapagos Islands exhibited "almost infinite variation." This variability is especially disconcerting in the form of the merus of the outer maxillipeds; that segment may be either subquadrate or markedly produced at the distolateral angle in specimens from the same general area. On the other hand, the prolongation of the posterolateral angles of the penultimate abdominal somite of the male and the form of the gonopods seem to

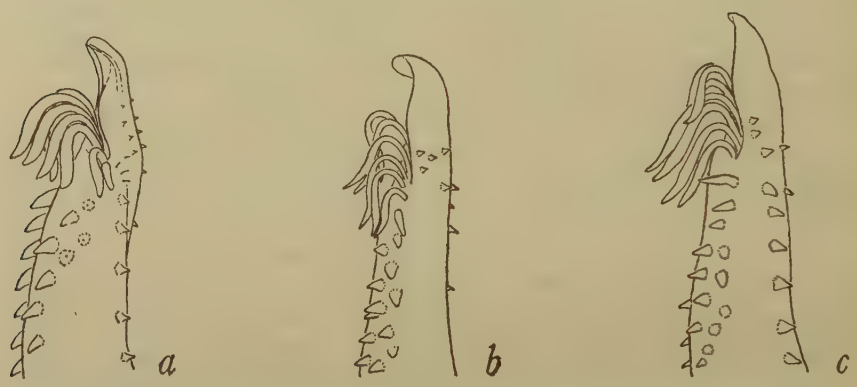


FIGURE 7.—*Micropanope melanodactylus*, laterocephalic aspects of right gonopods: *a*, homoeotype with carapace length of 6.1 mm. from roadstead of Porto Grande, St. Vincent; *b*, syntype of *Micropanope polita* with carapace length of 5.3 mm.; *c*, syntype of *Panopeus tanneri* with carapace length of 6.0 mm.

be reliable diagnostic characters. Intensive study of material from the eastern Atlantic and the eastern Pacific may eventually disclose differences of subspecific importance, but it seems best for the present to consider the two populations identical.

It is remarkable that this species, which is abundant in the eastern Atlantic and the eastern Pacific, is apparently absent from the western Atlantic. None of the species described from eastern America have gonopods that could be confused with those of *M. melanodactylus*. *M. truncatifrons* Rathbun, 1898, which is known from only two females and one juvenile from off Cuba and off Yucatan, bears a superficial resemblance to *M. melanodactylus*, but I believe that it is a distinct species; in both adult females, the front is straighter, the outer surfaces of the palms are more completely granular, and the color on the fingers is less extensive than in any specimens of *M. melanodactylus* examined.

I agree with Monod (1956, p. 324) that *M. melanodactylus* is probably not a synonym of *Xantho minor* Dana, 1852b. Unfortunately, the type-specimen of Dana's species is probably no longer extant, and his name is therefore likely to remain a *nomen dubium* indefinitely.

Distribution: West Africa (Gambia to Angola); Cape Verde Islands; St. Helena (new record); Baja California, Mexico (Bahia Magdalena and Cabo de San Lucas); Cocos Island; Galapagos Islands. Sublittoral to 225 meters.

Micropanope rufopunctata (A. Milne-Edwards)

FIGURE 8

Xanthodes refopunctatus A. Milne-Edwards, 1869, p. 409.
Pilumnus granulimanus Stimpson, 1871, p. 143.
Micropanope granulimanus.—Rathbun, 1930, p. 439, pl. 180, figs. 1, 2.
—Chace, 1956, p. 156.
Micropanope rufopunctata.—Monod, 1956, p. 313, figs. 386–392.

Material: Off Rupert's Bay; buoy cable; 0–75 meters; Jan. 17, 1958; 3 males, 1 ovigerous female.—Same; buoy; 0–2 meters; Feb. 2, 1959; 1 male, 1 young female.—Same; buoy and cable; 0–75 meters; Mar. 18, 1960; 12 males, 10 females.—Same; Apr. 5, 1962; 2 males, 5 females (1 ovigerous).—Same; buoy; 0–2 meters; Feb. 11, 1963; 1 young female.—James Bay; collected by skindiver; April 1964; 8 males, 6 females (2 ovigerous).

FIGURE 8.—*Micropanope rufopunctata*, cephalic aspects of right gonopods: *a*, specimen with carapace length of 5.8 mm. from Rupert's Bay buoy and cable; *b*, specimen with carapace length of 5.4 mm. from Caracas Bay, Curaçao; *c*, syntype of *Xanthodes granosus* with carapace length of 6.3 mm. from La Praya, Cape Verde Islands.

Measurements: Carapace lengths of males 2.5–5.8 mm.; of females without eggs, 2.8–7.0 mm.; of ovigerous females, 4.0–6.2 mm.

Remarks: There is little doubt that the specimens from the Bahamas and Curaçao that were identified by Rathbun (1930) as *Micropanope granulimanus* (Stimpson) belong to this species (compare figure 8*b* of the gonopod of a Curaçao specimen with figure 392 in

Monod, 1956, of a probably syntype of *Xanthodes rufopunctatus* from the Cape Verde Islands). Also, Monod is probably correct in synonymizing *Xanthodes granosus* A. Milne-Edwards and Bouvier, 1898, with this species. Monod noted that there were five subapical hooked spines on the gonopod of the syntype of *X. granosus* examined by him, whereas he found only four in what he believed to be type-material of *X. rufopunctatus*. The syntype of *X. granosus* in the collections of the U.S. National Museum, however, has only four hooked spines (fig. 8*c*), whereas the gonopod of the Curaçao specimen (fig. 8*b*), which otherwise closely resembles Monod's figure of the syntype of *X. rufopunctatus*, has five such spines.

Distribution: Eastern Mediterranean (Alexandria); Ghana; Azores; Canary Island; Cape Verde Islands; St. Helena (new record); Bahamas; Cuba; Curaçao; Islas Los Roques. Sublittoral to at least 30 meters.

Family Grapsidae

Subfamily Grapsinae

Grapsus grapsus (Linnaeus)

Cancer grapsus Linnaeus, 1758, p. 630.
Grapsus grapsus.—Cunningham, 1910, p. 122.—Monod, 1956, p. 407, fig. 561.
Grapsus maculatus.—Stebbing, 1914, pp. 254, 265.
Grapsus.—Colman, 1946, p. 271.

Material: James Bay; West Rocks; Sept. 6, 1958; fragments of cast shell of 1 male.—Rupert's Bay; Sept. 8, 1958; fragments of cast shell of 1 young male.—James Bay, West Rocks; Dec. 21, 1959; 1 young soft-shelled male (prey of sea anemone), cast shell of 1 young male.—Sandy Bay; rocks; Dec. 22, 1959; cast shell of 1 young female.—James Bay; Apr. 6, 1962; 1 dried male.—James Bay; from pool at West Rocks; June 10, 1963; 1 ovigerous female.—James Bay, West Rocks; June 14, 1963; 1 juvenile.

Measurements: Carapace lengths of males, about 15–54 mm.; of young female, 19.3 mm.; of ovigerous female, 40+ mm.; of juvenile, about 12 mm.

Distribution: Tropical and subtropical shores of the eastern and western Atlantic and the eastern Pacific. On rocks at and above tide level. A closely related species, *G. tenuicrustatus* (Herbst, 1783), inhabits the Indo-Pacific region.

Pachygrapsus loveridgei, new species

FIGURES 9, 10

Material: Off Rupert's Bay; buoy cable; 0–75 meters; Jan. 17, 1958; 5 males, 8 females (5 ovigerous), 1 intersex.—Same; buoy; 0–2

meters; Feb. 2, 1959; 10 males, 12 females (7 ovigerous).—Same; buoy and cable; 0–75 meters; Mar. 18, 1960; 31 males, 38 females (16 ovigerous), 2 juveniles [1 male is holotype, USNM 112457].—Same; Apr. 5, 1962; 23 males, 16 females (2 ovigerous), 2 juveniles.—Same; buoy; 0–2 meters; Feb. 11, 1963; 28 males, 35 females (18 ovigerous).—James Bay; collected by skindiver; February 1964; 1 female.—Same; April 1964; 6 males, 12 females (2 ovigerous).

Description: Carapace from one-fifth to one-third broader than long at all sizes. Surface evenly convex and covered with transverse striae, those on gastric and hepatic regions granulate and crowded, those on cardiac and intestinal regions fainter and sparser. Lateral margins slightly arched, strongly convergent posteriorly, and armed with an outstanding, acute tooth posterior to similar, but larger,

FIGURE 9.—*Pachygrapsus loveridgei*, male holotype.

outer orbital tooth. Median postfrontal lobes distinct and transverse, outer pair less prominent and slanting obliquely toward outer angle of front. Front slightly more than half as wide as carapace, anterior margin sinuous and granulate, faintly convex on both sides between shallow median and lateral sinuses, lateral margins converging anteriorly, surface with prominent granulate ridge behind each lobe and shorter, fainter striae elsewhere. Orbits oblique, about two-fifths as wide as front, lower border distinctly denticulate and separated by narrow notch from outer orbital tooth.

Chelipeds equal, merus and carpus transversely striated. Inner lobe of merus denticulate, with large and small notch at distal end forming three teeth. Carpal tooth blunt. Chelae robust; upper margin of palm with several oblique striae bearing a few small, pearly

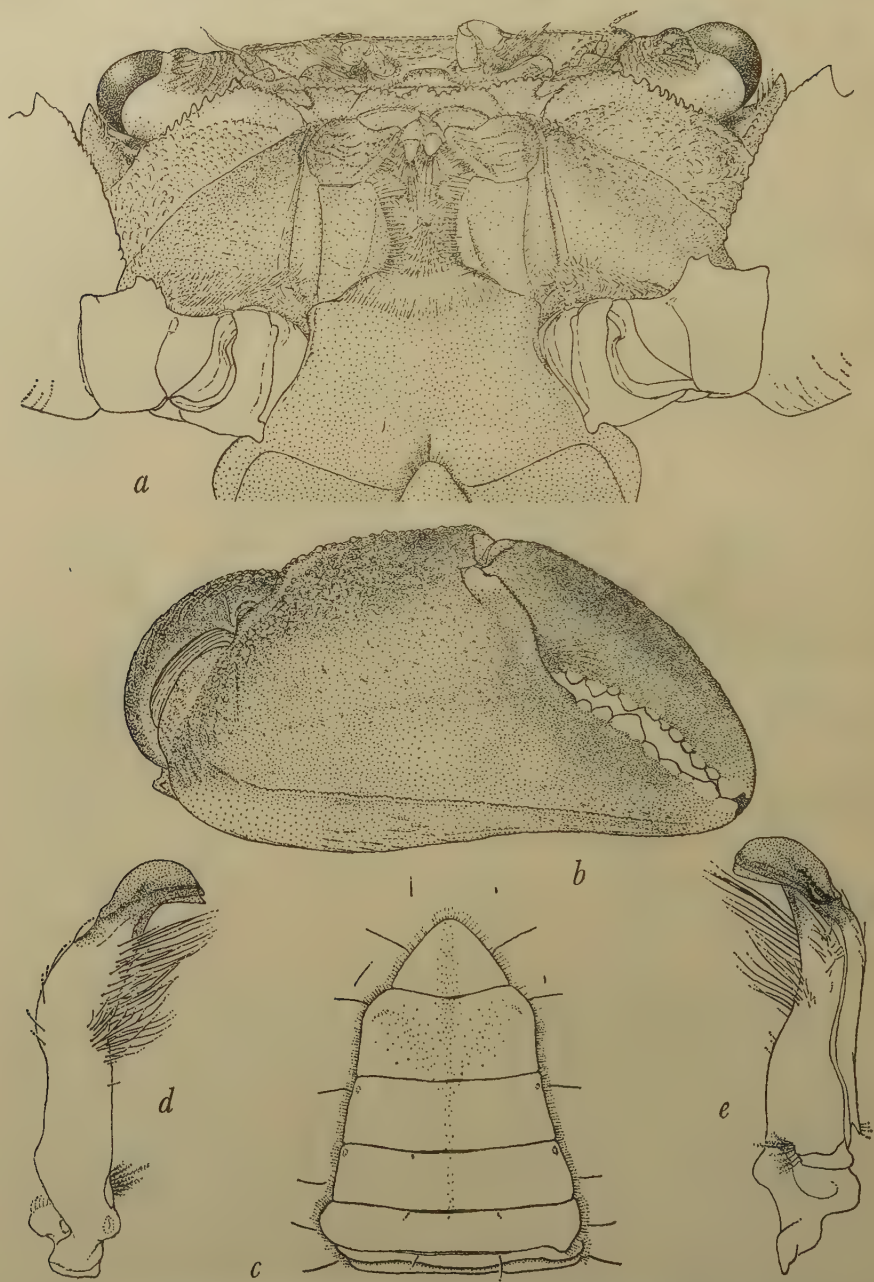
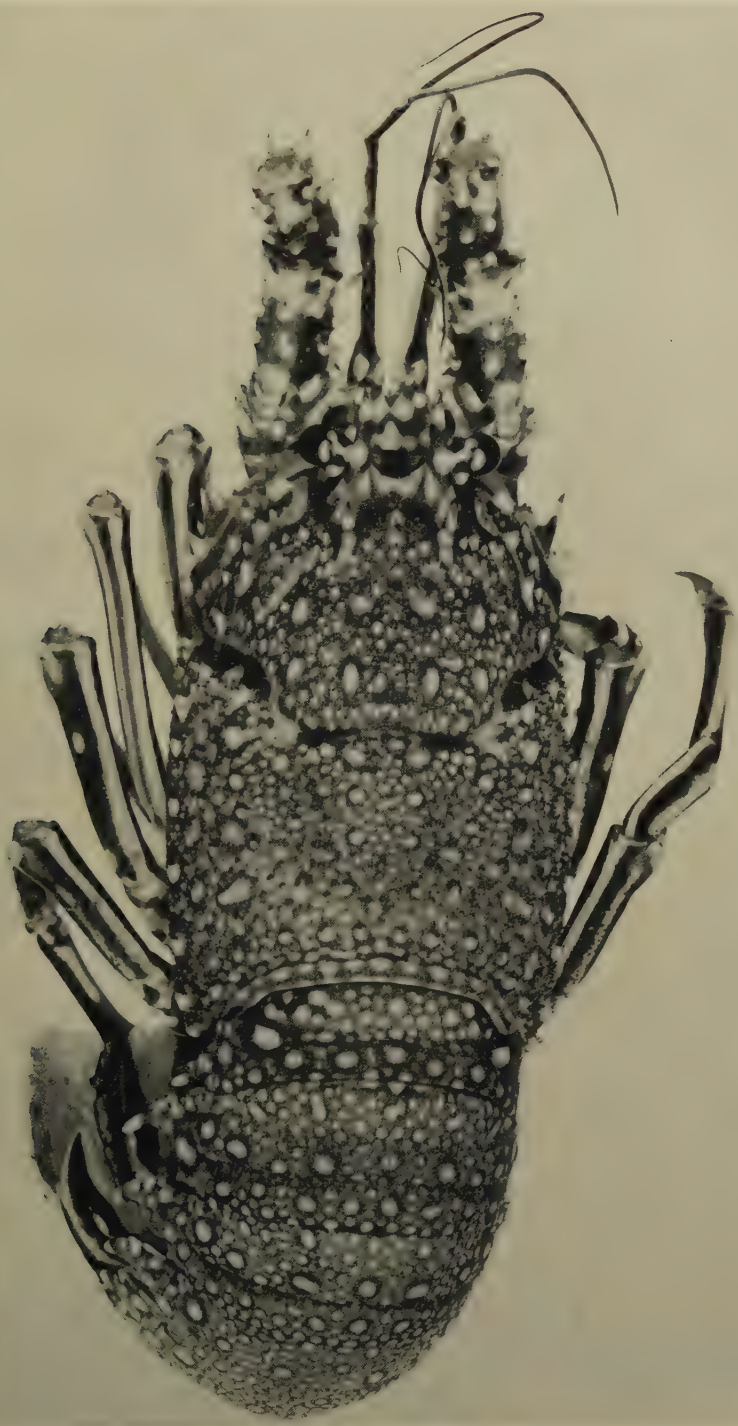


FIGURE 10.—*Pachygrapsus loveridgei*, male holotype: *a*, suborbital and buccal regions; *b*, outer surface of right chela; *c*, abdomen; *d*, left gonopod, caudal aspect; *e*, same, cephalic aspect.



Panulirus echinatus, dorsal view of ovigerous female from James Bay.

Panulirus echinatus lateral view of ovigerous female from James Bay.

tubercles, but without continuous marginal line dividing outer and inner faces; distinct longitudinal line running nearly entire length of outer surface of propodus near lower margin; palm about one and one-half times as high as length of superior surface; movable finger longer than height of palm; fingers narrowly gaping, except where interrupted by large, triangular tooth near middle of fixed finger; inner surface of palm very faintly rugose, with stronger striae near upper and lower margins. Merus of walking legs with small, subdistal spine on dorsal margin and with two or three triangular teeth at distal end of posterior margin; plumose setae covering much of anterior surfaces of carpus and propodus of first leg, becoming progressively sparser on second and third legs, and absent from last leg; second and third legs subequal, one and three-fourths times as long as carapace; first and fourth pairs subequal, shorter.

Terminal somite of male abdomen broadly triangular, with faintly sinuous margins (somewhat foreshortened in figure); margins of penultimate somite diverging slightly before converging strongly to distal margin. Broadly sickle-shaped end pieces of gonopods showing faintly through appressed abdomen.

Color: In ethyl alcohol, carapace mottled grayish brown, with all transverse striae dark brown; chelipeds dark reddish brown dorsally, fading to light tan on outer surface of palm and to nearly white near tips of fingers; walking legs mottled with brown, gray, and tan, proximal and distal ends of propodus and proximal end of dactyl nearly white, giving banded appearance to legs; conspicuous whitish patches on both sides of dactyl of chelipeds and walking legs, near tips of fingers of chelipeds, on lower surface of eyestalks, and at both ends of epistome at junction with inner end of lower margin of orbit.

Measurements: Carapace of male holotype, 10.3 mm. long, 13.1 mm. wide. Carapace lengths of male paratypes, 3.7–12.0 mm.; of females without eggs, 3.1–10.7 mm.; of ovigerous females, 3.2–12.4 mm.

Remarks: The general appearance of this crab, including the sinuous front and the plumose setae on the anterior surfaces of the first walking legs (noted by Holthuis, 1959, p. 240), is very similar to that of *Pachygrapsus transversus* (Gibbes, 1850). Comparison of St. Helena material with specimens of *P. transversus* from the eastern and western Atlantic and the eastern Pacific shows that *P. loveridgei* differs in having the dorsal surface of the carapace inflated and evenly convex, rather than flattened or depressed on the cardiac region; in having the transverse striae on the anterior half of the carapace more numerous and crowded; in lacking the longitudinal crenulate line that extends over the entire length of the upper surface of the palm in *P. transversus;* and in having the chitinous terminal portion of the

gonopods broadly sickle shaped, rather than obliquely T-shaped (see fig. 11*h*).

The genus *Pachygrapsus* is in need of intensive study and possible revision. As a contribution toward such a review, illustrations are offered in figure 11 of the gonopods of the described species in the national collections. Whenever possible, topotypic males have been selected. This study has demonstrated the importance of the gonopods at the species level in this genus. It has confirmed that *Sesarma murrayi* Calman, 1909, is identical with *Pachygrapsus minutus* A. Milne-Edwards, 1873 (see Schmitt, 1939, p. 22) and that *P. longipes* Rathbun, 1893, is a synonym of *P. planifrons* De Man, 1888 (see Edmondson, 1959, p. 175); the latter species seems to attain a somewhat larger size in Hawaiian waters than it does in Indonesia, but the gonopods are identical. How important the gonopods are at the generic level remains to be demonstrated. Those examined fall into two categories. One group [*P. crassipes* Randall, 1839; *P. gracilis* (De Saussure, 1858); *P. marmoratus* (Fabricius, 1787); *P. maurus* (Lucas, 1849); and *P. minutus*] has a dense brush of stout, amber setae which completely conceals the tip of the appendage. The other group [*P. loveridgei; P. planifrons; P. plicatus* (H. Milne Edwards, 1837); and *P. transversus*] bears more slender, longer setae which do not cover the chitinous end-piece. Attempts to relate these differences to other morphological characters have not been entirely successful. A cursory examination of the species available to me, however, shows a possible correlation between the two groups of species and the presence or absence of the conspicuous, but delicate, brush of plumose setae on the anterior surface of the first pair of walking legs. Such a brush was found in *P. loveridgei*, *P. minutus*, *P. plicatus*, and *P. transversus*. Although *P. minutus* is placed in the first group of species above (which otherwise lack plumose setae on the first walking legs), it might be assigned to either group; the endpiece of the gonopod is hidden by a few stout setae, but it does not project at an angle to the axis of the appendage as it does in the other species of that group. Also, the brush of setae was not observed in any of the available specimens of *P. planifrons*, a species that seems to belong to the second group on the basis of its gonopod. These setae are frequently lost in museum specimens, however; it would be important to know if they are present in fresh material of this species. A detailed study of the gonopods of all species of the family Grapsidae might yield worthwhile information on generic relationships.

Distribution: *P. loveridgei* is known only from St. Helena. It will be noticed that 85 of the 211 specimens were found on the buoy alone and were therefore living at or near the surface; it is not known

FIGURE 11.—Lateral (left) and caudal (right) aspects of gonopods of *Pachygrapsus* (*a–e* denuded): *a*, *P. crassipes*, Monterey Bay, Calif., carapace length 35.6 mm.; *b*, *P. gracilis*, St. Thomas, Virgin Islands, carapace length 8.7 mm.; *c*, *P. marmoratus*, Gibraltar, carapace length 30.5 mm.; *d*, *P. maurus*, Canary Islands, carapace length 8.5 mm.; *e*, *P. minutus*, Ponape, Caroline Islands, carapace length 8.2 mm.; *f*, *P. planifrons*, Honolulu, Hawaii, carapace length 9.5 mm.; *g*, *P. plicatus*, Hawaii, carapace length 11.7 mm.; *h*, *P. transversus*, Key West, Fla., carapace length 11.1 mm.

whether any of those from the cable anchored in 75 meters were clinging to it far below the surface.

Planes cyaneus Dana

Planes cyaneus Dana, 1852a, p. 250.—Chace, 1951, pp. 65-103, figs. lb, 2b, e, h, m–o, 3i–n.

?*Varuna atlantica* Melliss, 1875, p. 203.

Material: Off northeast coast of St. Helena; from drifting kelp; Nov. 25, 1960; 1 female.—Sandy Bay; from kelp on beach; Dec. 29, 1962; 1 young female.—Off Rupert's Bay; buoy; 0–2 meters; Feb. 11, 1963; 3 males, 5 females (4 ovigerous).—James Bay; collected by skindiver; February 1964; 1 female.

Measurements: Carapace lengths of males, 14.0–22.7 mm.; of females without eggs, 6.9–26.0 mm.; of ovigerous females, 14.2–16.9 mm.

Remarks: Three or four of the specimens found on the buoy off Rupert's Bay were blue in life (white in alcohol). The others were mottled light to dark brown in alcohol, and three of them had a large, whitish patch extending over much of the anterior part of the carapace, similar to the color pattern illustrated for *Planes minutus* (Linnaeus, 1758) in Murray and Hjort (1912, pl. 6) and Sivertsen and Holthuis (1956, pl. 2).

The "pretty little bright-blue Crab" from the hull of a ship, which Melliss (1875) recorded as *Varuna atlantica* (a name apparently coined by Spence Bate), may represent the first Atlantic record of *P. cyaneus*. The fact that the species was represented in the Loveridge collection by material taken in 4 different years indicates that its occurrence in the South Atlantic is more than transitory.

Distribution: On floating objects in the open sea throughout the eastern Pacific and presumably westward into the Indian Ocean; St. Helena. Probably some or all of the South African records of *P. minutus* cited by Barnard (1950, p. 120) should be referred to this species.

Planes marinus Rathbun

Planes marinus Rathbun, 1914, p. 120, pl. 3.

Pachygrapsus marinus.—Chace, 1951, pp. 65–103, figs, 1c, 2c, f, i, p–r, 3o–t.—Hart, 1959, p. C 31.—Edmondson, 1959, p. 169, fig. 8b.—Dell, 1963, pp. 179, 180, fig. 1.

Material: Off northeast coast of St. Helena; from drifting kelp; Nov. 25, 1960; 1 male, 2 young females.—Off Rupert's Bay; buoy; 0–2 meters; Feb. 11, 1963; 2 ovigerous females.

Measurements: Carapace length of male, 9.1 mm.; of young females, 4.9 and 5.4 mm.; of ovigerous females, 13.4 and 15.1 mm.

Remarks: Dell (1963) noted that this species has natatory fringes on the walking legs, just as do the other two species of *Planes*. The specimens that were available for my earlier study (Chace, 1951) were so worn that this fringe was reduced to stiff bristles at most. All of the St. Helena specimens have well-developed natatory fringes. On the basis of this character and the form of the gonopods, it seems best to return the species to the genus to which it was originally assigned by Rathbun and to minimize the importance of the shape of the carapace and chelipeds, which led me to transfer it to *Pachygrapsus*.

Distribution: At sea, west of Baja California, Mexico; coast of Oregon (from Japanese mine washed ashore); at sea, southwest of Vancouver Island, British Columbia (from netting and barnacles on large Japanese glass float); windward shores of Oahu, Hawaii; Eastern Bay of Plenty, New Zealand (among stalked barnacles on Japanese glass float); St. Helena (first Atlantic record). This species is probably more common on floating objects than the rather sparse records would indicate.

Subfamily Plagusiinae

Plagusia depressa (Fabricius)

Cancer depressus Fabricius, 1775, p. 406.
Plagusia depressa.—Cunningham, 1910, p. 122.—Monod, 1956, p. 455, figs. 614–617.
Plagusia.—Colman, 1946, p. 271.

Material: Off Rupert's Bay; buoy cable; 0–75 meters; Jan. 17, 1958; 1 female.—Same; buoy; 0–2 meters; Feb. 2, 1959; 17 males, 16 females (3 ovigerous), 2 juveniles.—James Bay, West Rocks; Dec. 21, 1959; fragments of cast shell of 1 male.—Off Rupert's Bay; buoy and cable; 0–75 meters; Mar. 18, 1960; 34 males, 20 females (1 ovigerous), 10 juveniles.—Same; Apr. 5, 1962; 1 male.—Same; buoy; 0–2 meters; Feb. 11, 1963; 9 males, 11 females (5 ovigerous), 1 fragmentary specimen.—James Bay; collected by skindiver; February 1964; 4 juveniles.—Same; April 1964; 11 males, 12 females (2 ovigerous).

Measurements: Carapace lengths of males in midline, 9.2–41.5 mm.; of females without eggs, 9.0–23.6 mm.; of ovigerous females, 19.1–33.3 mm.; of juveniles, 5.7–9.2 mm.

Remarks: Most of the St. Helena specimens are immature, with carapace lengths of less than 20 mm. (at about which size the female abdomen attains its full breadth). The largest specimen, except for the cast shell from James Bay, is a male with a carapace length of 35.2 mm. Nearly half (57 of 122) of the specimens from the buoy and cable off Rupert's Bay have carapaces less than 14 mm. long (with triangular female abdomens), but only 12 of these were so small (carapace lengths of less than about 9 mm.) as to be sexually indeterminable.

Comparison of the male gonopods of the species of *Plagusia* in the national collections [*P. chabrus* (Linnaeus, 1758); *P. dentipes* (De Haan, 1835); *P. depressa; P. glabra* Dana, 1852b; *P. immaculata* Lamarck, 1818; *P. speciosa* Dana, 1852a; and *P. tuberculata* Lamarck, 1818] indicated that *P. depressa*, *P. immaculata*, and *P. tuberculata* are most closely related to each other (although they are probably specifically distinct) than they are to the other four species.

Distribution: West Africa and off-lying islands from Senegal to Angola; western Atlantic from South Carolina to Brazil; Bermudas; St. Helena. Littoral and on ships' hulls and other floating objects.

Family Majidae

Subfamily Acanthonychinae

Acanthonyx sanctaehelenae, new species

FIGURES 12, 13*e–h*

Material: Off Rupert's Bay; buoy; 0–2 meters; Feb. 2, 1959; 3 males, 1 juvenile [1 male is holotype, USNM 112458].—Same; buoy and cable; 0–75 meters; Mar. 18, 1960; 6 males, 1 female.—Same; Apr. 5, 1962; 1 ovigerous female.—Same; buoy; 0–2 meters; Feb. 11, 1963; 4 males, 1 ovigerous female.

Description: Carapace broadly pear shaped in adults; length of males in midline, not including rostral horns, one-sixth to one-fifth longer than maximum breadth; adult females proportionately broader. Dorsal surface of carapace and legs of large males with very fine but tough pubescence forming tangled mat of long hairs on margins of carapace, chelipeds, and anterior walking legs; less dense covering of shorter hairs on most of dorsal surface of carapace and on posterior legs. Hepatic lobe produced anteriorly, not rectangular. Two low, subequal lobes or teeth on branchial margin. Rostral horns and preorbital, hepatic, and branchial lobes bearing terminal tufts of stout setae. Rostral sinus narrowly V-shaped. Basal article of antennae unarmed, two succeeding articles subcylindrical, reaching as far as end of rostral horns. Chelipeds with merus subtriangular, two lobes near proximal end of outer margin; carpus with blunt outer crest; chela of male swollen, slightly compressed dorsally; fingers gaping throughout in male, only proximally in female. Abdomen with fourth and fifth somites indistinguishably fused in both sexes, third and fourth somites partially so in large males.

Male abdomen and gonopods as figured.

Measurements: Carapace of male holotype, 18.0 mm. long in midline, 20.0 mm. to tip of rostral horn, 15.0 mm. in maximum width. Carapace lengths of male paratypes in midline, 4.7–16+ mm.; of

female without eggs, 4.7 mm.; of ovigerous females, 4.2 and 9.8 mm.; of juvenile, 2.1 mm.

Remarks: Although the St. Helena specimens closely resemble the variable *Acanthonyx petiverii* H. Milne Edwards, 1834, from tropical waters of the western Atlantic and eastern Pacific, and *A. lunulatus*

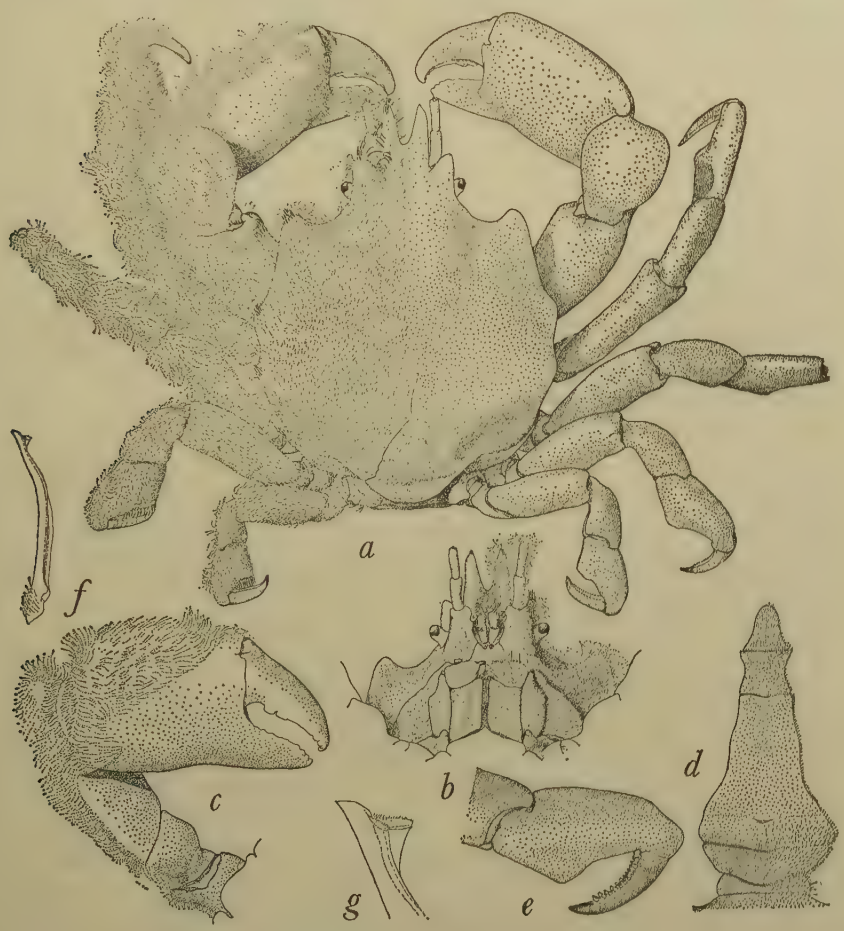


FIGURE 12.—*Acanthonyx sanctaehelenae*, male holotype: *a*, dorsal aspect of crab, right half denuded; *b*, suborbital and buccal regions; *c*, right cheliped; *d*, abdomen; *e*, propodus and dactyl of right posterior leg; *f*, caudal aspect of right gonopod; *g*, tip of same.

(Risso, 1816) from the eastern Atlantic and Mediterranean (fig. 13), I believe that they represent a distinct species. In the general configuration of the carapace, *A. sanctaehelenae* seems nearest to *A. lunulatus*, but apparently it can be distinguished from that species by the broader, more pear-shaped carapace and the V-shaped, rather than broadly U-shaped, sinus between the rostral horns.

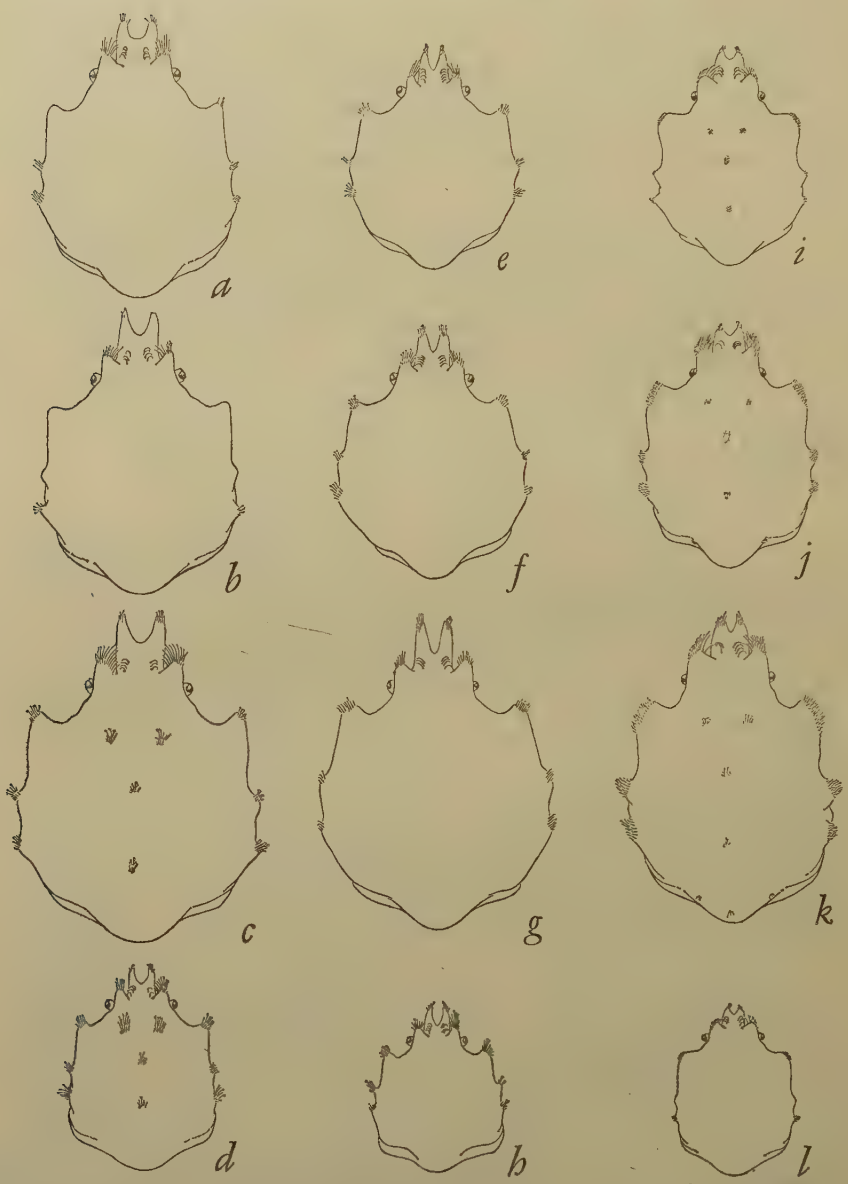


FIGURE 13.—Carapace variation in *Acanthonyx lunulatus* (*a–d*), *A. sanctaehelenae* (*e–h*) and *A. petiverii* (*i–l*): *a*, male, Naples, Italy, carapace length 16.5 mm.; *b*, male, Messina, Italy, carapace length 17.0 mm.; *c*, male, Naples, Italy, carapace length 19.3 mm.; *d*, ovigerous female, Cadaques, Spain, carapace length 12.2 mm.; *e*, male, carapace length 13.0 mm.; *f*, male, carapace length 15.0 mm.; *g*, male, carapace length 18.1 mm.; *h*, ovigerous female, carapace length 9.7 mm.; *i*, male, Martinique, carapace length 13.3 mm.; *j*, male, St. Croix, Virgin Islands, carapace length 15.2 mm.; *k*, male, St. Croix, carapace length 18.5 mm.; *l*, ovigerous female, Martinique, carapace length 10.3 mm.

Only the three largest males, with carapace lengths to the base of the rostral sinus of 14.9 to 18.0 mm., are conspicuously pubescent, and the smallest of these has the matted covering largely confined to the chelipeds. Also, all of the males except the largest (the holotype) have a distinct, though not always completely functional, suture between the third and fourth abdominal somites.

Distribution: Known only from the type locality off Rupert's Bay, St. Helena.

Subfamily Pisinae

Pisa sanctaehelenae, new species

FIGURE 14

Material: Off Rupert's Bay; buoy; 0–2 meters; Feb. 11, 1963; 1 male, 2 ovigerous females [male is holotype, USNM 112459].

Description: Carapace, not including rostral and lateral spines, one-sixth to one-third longer than broad. Regions well marked and uneven. Cardiac region swollen, surrounded by broad, deep furrow accentuated laterally by curved, longitudinal ridge near inner margin of each metabranchial region. Intestinal region with median prominence. Branchial region bearing lateral boss with obscure longitudinal sulcus behind cervical groove and three smaller prominences in oblique row across mesobranchial region, posteriormost forming blunt tooth on posterolateral margin. Surface pubescence sparse, but groups of hooked hairs (shown on left side of fig. 14*a*) on rostral spines, on anterior and posterior portions of each protogastric region, on branchial prominences, and along margin of each branchial region. Rostral spines divergent throughout. Supraocular eave with long anterior spine and distinct tooth at posterior angle. Tooth between supraocular eave and postocular process large, virtually closing dorsal margin of orbit. Strong spine on hepatic region behind postocular process. Four distinct spines on lateral margin of branchial region, first two close together, last largest, nearly as large as hepatic spine. Basal antennal article with long anterior spine visible from above and approaching preocular spine in length. Distinct tooth just posterior to posterolateral angle of basal antennal article. Row of three acute teeth, decreasing in size posteriorly, on each pterygostomian region.

Chelipeds of male about as long as carapace. Merus covered with raised tubercles and four spines, one terminal, in dorsal midline. Carpus with four rows of large tubercles delimiting three broad, longitudinal sulci. Hand with massive tubercle at dorsal articulation with carpus and double row of irregular tubercles or sharp granules forming shallow longitudinal sulcus in dorsal margin; ventral margin with blunt carina on proximal three-fourths; outer surface micro-

scopically roughened but not tuberculate; inner surface swollen and bearing about five pearly tubercles scattered on swollen portion. Fingers meeting in distal half, gaping proximally, with large, rectangular, serrate tooth on basal third of movable finger. Chelipeds of

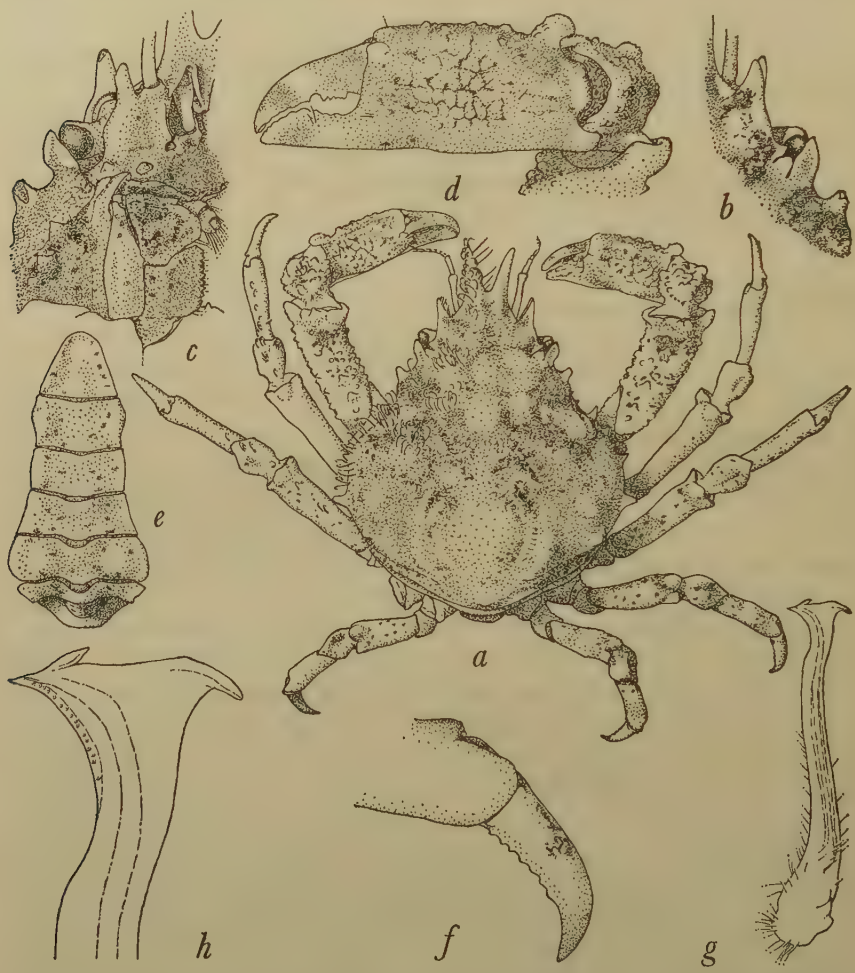


FIGURE 14.—*Pisa sanctaehelenae*, male holotype: *a*, dorsal aspect of crab, right half denuded; *b*, orbit in dorsal view; *c*, suborbital region; *d*, left chela; *e*, abdomen; *f*, dactyl of right posterior leg; *g*, mesiocaudal aspect of right gonopod; *h*, tip of same.

females smaller; merus and carpus strongly spinose; chela smoother, without basal tooth on movable finger. Walking legs decreasing in length posteriorly; merus with rounded dorsal protuberance terminally; carpus with single tubercle near meral articulation, followed by deep longitudinal furrow; propodus of first leg swollen distally in

male only; dactyl with five to seven low tubercles on ventral margin.

Male abdomen and gonopods as figured.

Color: In ethyl alcohol, carapace with rusty to orange-red reticulated mottling on grayish background; elevations cream colored. Chelipeds with dark, rusty red patch near distal end of upper surface of merus and reticulations of same color on carpus and on inner and outer surfaces of hand; light orange-red mottling on upper surface of hands and in two bands on fingers. Speckels of red on ambulatory legs and on ventral surfaces of crab.

Measurements: Carapace of male holotype, 11.3 mm. long in midline, 13.2 mm. long to tip of rostral spine, 9.7 mm. wide between branchial margins, 10.7 mm. wide between tips of lateral spines. Carapace of ovigerous female paratypes, 5.8 and 8.2 mm. long in midline, 7.0 and 9.2 mm. long to tips of rostral spines, 4.3 and 6.8 mm. wide between branchial margins, 5.0 and 7.6 mm. wide between tips of lateral spines.

Remarks: *Pisa sanctaehelenae* bears a faint resemblance to *P. carinimana* Miers, 1879, from West Africa and the Canary Islands, but it is readily distinguished by the much stronger preocular and antennal spines, the salient posterolateral angle of the supraocular eave, the larger intermediate supraocular tooth, the more uneven carapace, and the more numerous spines on the branchial margins.[2]

Distribution: Known only from the type locality off Rupert's Bay, St. Helena, where it was represented only in the last of the five collections made from the buoy and cable at that location.

Distribution

The distribution of the 23 species of decapod crustaceans (fig. 15) does not conform exactly with the distribution patterns of St. Helena fishes (Cunningham, 1910, and Cadenat and Marchal, 1963), mollusks (E. A. Smith, 1890), and echinoderms (Mortensen, 1933). Colman (1946, p. 279) concluded from the studies published prior to 1946 that "In each case the principal links are with the West Indies first, and secondly, with the Mediterranean and north-east Atlantic, while there is only a slight connection with South Africa." Cadenat and Marchal (p. 1307) state that "les affinites de cette faune sont tres nettement plus antillaises que ouest-africaines." On the contrary, the decapods seem to be more closely allied to the West African than to the East American faunas. Excluding the six decapods that are found in

[2] *Pisa sanctaehelenae* seems to differ from the closely related *P. calva* Forest and Guinot, 1966 (p. 99, figs. 10, 11a–f, 13), in its divergent rostral spines, more salient posterolateral angle of the supraocular eave, and more angularly sinuous shaft of the male gonopod.

both the western and eastern Atlantic, only three species are common to St. Helena and eastern America, whereas seven West African species are represented at St. Helena.

Eastern Pacific	Western Atlantic		Eastern Atlantic	Indo-Pacific
		Synalpheus fritzmuelleri		
		Grapsus grapsus		
		Micropanope melanodactylus		
		Brachycarpus biunguiculatus		
		Planes cyaneus		
		Planes marinus		
		Dromia erythropus		
		Panulirus echinatus		
		Micropanope rufopunctata		
		Plagusia depressa		
		Calappa gallus		
		Enoplometopus antillensis		
		Dardanus imperator		
		Pachygrapsus loveridgei		
		Acanthonyx sanctaehelenae		
		Pisa sanctaehelenae		
		Pontonia pinnophylax		
		Alpheus macrocheles		
		Scyllarides herklotsii		
		Albunea carabus		
		Actaea margaritaria		
		Dardanus arrosor		
		Alpheus paragracilis		

FIGURE 15.—Geographic distribution of the decapod crustaceans of St. Helena Island.

Only one of the decapods, the oceanic crab *Planes cyaneus*, probably reached St. Helena from South Africa. This ratio corresponds with that in the St. Helena echinoderms, of which only *Asterina exigua* now occurs in South Africa. Mortensen believed that this sea star was transported on floating kelp, which is regularly carried from South

Africa to St. Helena in the trade-wind drift; this explanation almost certainly applies to *Planes*, which is a habitual passenger on floating weed. *Calappa gallus*, which occasionally occurs on the east coast of South Africa, probably never reaches the Cape of Good Hope, and there is little likelihood that it migrated directly from there to St. Helena in the recent past. The evidence of a link between the faunas of St. Helena and South Africa is even more obscure in the mollusks, of which only 6 of 182 St. Helena species were known from South Africa, but Cunningham reported a closer relationship in the fishes, of which no less than 12 of 33 St. Helena species were reported from South Africa.

One of the more surprising disclosures of the study of the Loveridge collections is the number of Pacific species represented. The proportion of decapods common to St. Helena and to the Indo-Pacific (30 percent) and eastern Pacific (26 percent) is noticeably greater than it is in the fishes (24 and 18 percent), mollusks (8 and 5 percent), and echinoderms (15 and 8 percent). Also, at least four of the decapods that have been reported from the Pacific (*Alpheus paragracilis*, *Enoplometopus antillensis*, *Micropanope melanodactylus*, and *Planes marinus*) seem to have discontinuous distributions. (The probable occurrence of *Planes cyaneus* off South Africa eliminates that crab from this group.) A possible explanation for such interrupted distributional patterns (aside from insufficient collecting) is that some of the species have been transported on the hulls of ships. For those species that could withstand a few days' exposure to cool temperatures, there was ample opportunity for introduction to St. Helena by this method when the island was a regular port of call for vessels sailing around Cape Horn or the Cape of Good Hope before the construction of the Suez and Panama Canals.

Finally, the four possibly edemic decapods thus far described from St. Helena (*Dardanus imperator*, *Pachygrapsus loveridgei*, *Acanthonyx sanctaehelenae*, and *Pisa sanctaehelenae*) are proportionately fewer (17 percent) than are the fishes (29 percent), mollusks (52 percent), and echinoderms (50 percent) that are confined to St. Helena (and Ascension Island). Further collecting, or even the study of existing collections, may reveal additional undescribed species, and it is not unlikely that specimens now assigned to some of the more widely ranging species, such as *Pontonia pinnophylax*, *Alpheus macrocheles*, *Panulirus echinatus*, *Enoplometopus antillensis*, *Dardanus arrosor*, *Albunea carabus*, and *Dromia erythropus*, will eventually prove to be specifically or subspecifically distinct.

Literature Cited

BANNER, ALBERT H.
1953. The Crangonidae, or snapping shrimp, of Hawaii. Pacific Sci., vol. 7, no. 1, pp. 2–144, 50 figs.

BARNARD, K. H.
1950. Descriptive catalogue of South African decapod Crustacea. Ann. South African Mus., vol. 38, pp. 1–837, 154 figs.

BOUVIER, E. L.
1917. Crustacés décapodes (macroures marcheurs) provenant des campagnes *Hirondelle* et *Princesse-Alice* (1885–1915). Rés. Camp. Sci. Monaco, fasc. 50, 140 pp., 11 pls.

CADENAT, J., and MARCHAL, E.
1963. Poissons. *In* Résultats des campagnes océanographiques de la Reine-Pokou aux îles Sainte-Hélène et Ascencion. Bull. Inst. Français Afrique Noire, vol. 25, ser. A, no. 4, pp. 1235–1315, 48 figs.

CALMAN, W. T.
1909. On decapod Crustacea from Christmas Island, collected by Dr. C. W. Andrews, F.R.S., F.Z.S. Proc. Zool. Soc. London, 1909, pp. 703–713, 1 pl.

CHACE, FENNER A., JR.
1951. The oceanic crabs of the genera *Planes* and *Pachygrapsus*. Proc. U.S. Nat. Mus., vol. 101, no. 3272, pp. 65–103, 8 figs.
1956. Crustaceos decapodos y stomatopodos del Archipielago de Los Roques e Isla de La Orchila. *In* El Archipielago de Los Roques y La Orchila, Sociedad de Ciencias Naturales La Salle, pp. 145–168, 4 pls.

COLMAN, JOHN
1946. Marine biology in St. Helena. Proc. Zool. Soc. London, vol. 116, pp. 266–281, 3 pls.

COUTIÈRE, HENRI
1897. Note sur quelques alphées nouveaux. Bull. Mus. Hist. Nat. Paris, vol. 3, pp. 303–306.
1905. Les Alpheidae. *In* J. Stanley Gardiner, The fauna and geography of the Maldive and Laccadive archipelagoes, being the account of the work carried on and of the collections made by an expedition during the years 1899 and 1900, vol. 2, pt. 4, pp. 852–921, 18 pls.
1909. The American species of snapping shrimps of the genus *Synalpheus*. Proc. U.S. Nat. Mus., vol. 36, pp. 1–93, 54 figs.

CUNNINGHAM, J. T.
1910. On the marine fishes and invertebrates of St. Helena. With description of new species of Hydrozoa and Porifera, by R. Kirkpatrick, F.Z.S. Proc. Zool. Soc. London, 1910, pp. 86–131, 4 figs., 4 pls.

DANA, JAMES D.
1852a. Conspectus crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wilkes e classe Reipublicae Foederatae duce. Proc. Acad. Nat. Sci. Philadelphia, vol. 5, 1850–51, pp. 247–254.
1952b. Crustacea. *In* United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N., vol. 13, viii+1618 pp.

DELL, R. K.
1963. *Pachygrapsus marinus* (Rathbun), a new crab for New Zealand waters. Trans. Roy. Soc. New Zealand, Zool., vol. 3, no. 18, pp. 179, 180, 3 figs.

EDMONDSON, CHARLES HOWARD
1959. Hawaiian Grapsidae. Occ. Pap. Bernice P. Bishop Mus., vol. 22, no. 10, pp. 153–202, 27 figs.

EDWARDS, GEORGE
1771. Catalogue of animals in Catesby's Natural History of Carolina, with the Linnaean names.

FABRICIUS, J. C.
1775. Systema entomologiae, sistens insectorum classes, ordines, genera, species, adjectis synonymis, locis, descriptionibus, observationibus, 832 pp.
1787. Mantissa insectorum sistens eorum species nuper detectas adiectis characteribus genericis, differentiis specificis, emendationibus, observationibus, vol. 1, xx+348 pp.

FAXON, WALTER
1893. Preliminary descriptions of new species of Crustacea. *In* Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S. Fish Commission Steamer "Albatross," during 1891, VI. Bull. Mus. Comp. Zoöl. Harvard, vol. 24, pp. 149–220.

FOREST, JACQUES
1955. Crustacés décapodes, pagurides. *In* Expédition océanographique Belge dans les eaux côtières Africaines de l'Atlantique sud (1948–1949). Rés. Sci., vol. 3, fasc. 4, pp. 23–147, 32 figs., 6 pls.

FOREST, J., AND GUINOT, D.
1966. Campagne de la *Calypso* dans le Golfe de Guinée et aux iles Principe, Sao Tomé et Annobon (1956), 16: Crustacés décapodes: Brachyoures. Rés. Sci. Camp. "Calypso," fasc. 7, pp. 23–124, 19 figs.

GARTH, JOHN S.
1946. Littoral brachyuran fauna of the Galapagos Archipelago. *In* Allan Hancock Pacific Expeditions, vol. 5, no. 10, pp. i–iv, 341–601, 1 fig., 39 pls.

GIBBES, LEWIS R.
1850. On the carcinological collections of the cabinets of natural history in the United States: With an enumeration of the species contained therein, and descriptions of new species. Proc. Amer. Assoc. Adv. Sci., vol. 3, pp. 165–201.

GUÉRIN-MÉNEVILLE, F. E.
1855. Notice sur un nouveau genre de crustacés de la tribu des Scyllariens, découvert par M. Verany, aux environs de Nice. Rev. Mag. Zool., ser. 2, vol. 7, pp. 137–141, 1 pl.

HAAN, W. DE
1833–1850. Crustacea. *In* P. F. de Siebold, Fauna Japonica, xvii+xxxi+244 pp., 74 pls.

HAILSTONE, S.
1835. Descriptions of some species of crustaceous animals; with illustrations and remarks by J. O. Westwood. Mag. Nat. Hist., vol. 8, pp. 261–277, 394, 395, 549–553, 11 figs.

HART, JOSEPHINE F. L.
1959. A new distributional record for oceanic crabs. Rep. Prov. Mus., British Columbia, 1958, p. C 31.

HERBST, JOHANN FRIEDRICH WILHELM

1782–1790. Versuch einer Naturgeschichte der Krabben und Krebse nebst einer systematischen Beschreibung ihrer verschiedenen Arten, vol. 1, 274 pp., 21 pls.

1791–1796. Ibid., vol. 2, viii+226 pp., 25 pls.

1803. Ibid., vol. 3, pt. 3, 54 pp., 4 pls.

HERKLOTS, JANUS ADRIANUS

1851. Additamenta ad faunam carcinologicam Africae occidentalis, sive descriptiones specierum novarum e Crustaceorum ordine, quas in Guinea collegit vir strenuus H. S. Pel praefectus residentiis in littore Guineae, 29 pp., 2 pls.

HOLTHUIS, LIPKE BIJDELEY

1946. The Stenopodidae, Nephropsidae, Scyllaridae and Palinuridae. No. 1 *of* vol. 14 (Decapoda Macrura) *in* Biological Results of the Snellius Expedition. Temminckia, vol. 7, 178 pp., 2 figs., 11 pls.

1951. The caridean Crustacea of tropical West Africa. *Atlantide* Rep. no. 2, pp. 7–187, 34 figs.

1952a. A general revision of the Palaemonidae (Crustacea Decapoda Natantia) of the Americas, 2: The subfamily Palaemoninae. Allan Hancock Found. Publ. Occ. Pap., no. 12, 396 pp., 55 pls.

1952b. Crustacés décapodes, macrures. *In* Expédition océanographique Belge dans les eaux côtieres Africaines de l'Atlantique sud (1948–1949). Rés. Sci., vol. 3, fasc. 2, pp. 1–88, 21 figs.

1959. The Crustacea Decapoda of Suriname (Dutch Guiana). Zool. Verh. Leiden, no. 44, 296 pp., 68 figs., 16 pls.

1961. The taxonomic status of *Panulirus echinatus* Smith, 1869 (Decapoda Macrura, Palinuridae). Crustaceana, vol. 2, pt. 3, pp. 223–227, 1 fig.

HOLTHUIS, L. B., and GOTTLIEB, E.

1958. An annotated list of the decapod Crustacea of the Mediterranean coast of Israel, with an appendix listing the Decapoda of the eastern Mediterranean. Bull. Res. Council Israel, vol. 7B, pp. 1–126, 15 figs., 3 pls.

KRAUSS, FERDINAND

1843. Die Sudafrikanischen Crustaceen: Eine Zusammenstellung aller bekannten Malacostraca, Bemerkungen über deren Lebensweise und geographische Verbreitung, nebst Beschreibung und Abbildung mehrer neuen Arten, 68 pp., 4 pls.

LAMARCK, J. B. P. A. DE

1818. Histoire naturelle des animaux sans vertèbres, etc., vol. 5, 612 pp.

LINNAEUS, CARL

1758. Systema naturae per regna tria naturae, secundum classes ordines, genera species, cum characteribus, differentiis, synonymis, locis, ed. 10, vol. 1, 824+iii pp.

LUCAS, H.

1849. Crustacés, arachnides, myriopodes et hexapodes. Exploration scientifique de l'Algérie pendant les années 1840, 1842. Sciences physiques. Zoologie I. Histoire naturelle des animaux articulés, pt. 1, pp. 1–403, 8 pls.

LÜTKEN, C.

1865. *Enoplometopus antillensis* Ltk., en ny vestindisk Hummer-Art. Vidensk. Medd. Naturh. Foren. Kbh., vol. 6, pp. 265–268.

MAN, J. G. DE
1888. Bericht über die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. Arch. Naturg., vol. 53, pt. 1, pp. 215–600, 17 pls.

MELLISS, JOHN CHARLES
1875. St. Helena: a physical, historical, and topographical description of the island, including its geology, fauna, flora, and meteorology, xiv+426 pp., 62 pls.

MIERS, EDWARD J.
1879. Descriptions of new or little-known species of maioid Crustacea (Oxyrhyncha) in the collection of the British Museum. Ann. Mag. Nat. Hist., ser. 5, vol. 4, pp. 1–28, 2 pls.
1880. On a collection of Crustacea from the Malaysian region, 3: Crustacea Anomura and Macrura (except *Penaeidea*). Ann. Mag. Nat. Hist., ser. 5, vol. 5, pp. 370–384, 2 pls.
1881. On a collection of Crustacea made by Baron Hermann-Maltzam at Goree Island, Senegambia. Ann. Mag. Nat. Hist., ser. 5, vol. 8, pp. 204–220, 259–281, 364–377, 4 pls.
1882. On crustaceans from the Mauritius, 2. Proc. Zool. Soc. London, 1882, pp. 538–543, 1 pl.

MILNE-EDWARDS, ALPH.
1867. *In* L. De Folin and L. Périer, Description des espèces nouvelles de crustacés provenant de Saint-Vincent du Cap Vert. Les Fonds de la Mer, vol. 1, chap. 9, pp. 32–44, 2 pls.
1869. Description de quelques espèces nouvelles de crustacés provenant du voyage de M. A. Bouvier aux Iles du Cap Vert. Rev. et. Mag. Zool., Paris, ser. 2, vol. 21, pp. 350–355, 374–378, 409–412.
1873. Recherches sur la faune carcinologique de la Nouvelle-Caledonie. Nouv. Arch. Mus. Paris, vol. 9, pp. 155–332, 15 pls.

MILNE-EDWARDS, A., and BOUVIER, E. L.
1898. Crustacés nouveaux provenant des campagnes du Travailleur et du Talisman. Bull. Mus. Hist. Nat., Paris, vol. 4, pp. 183–190.

MILNE-EDWARDS, H.
1834, 1837. Histoire naturelle des crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux, vol. 1, 468 pp.; vol. 2 (1837), 532 pp.

MONOD, TH.
1956. Hippidea et Brachyura ouest-africains. Mem. Inst. Français Afrique Noire, no. 45, 674 pp., 884 figs.

MORTENSEN, TH.
1933. The echinoderms of St. Helena (other than crinoids). *In* Papers from Dr. Th. Mortensen's Pacific Expedition 1914–16, LXVI. Vidensk. Medd. fra Dansk naturh. Foren., vol. 93, pp. 401–473, 29 figs., 3 pls.

MURRAY, JOHN, and HJORT, JOHAN
1912. Depths of the ocean, xx+821 pp., 575 figs., 9 pls.

ODHNER, T.
1925. Monographierte Gattungen der Krabbenfamilie Xanthidae, I. Göteborgs Kungl. Vetenskaps- och Vitterhets-Samhälles Handlingar, Fjarde Foljden, vol. 29, no. 1 (Meddel. fran Goteborgs Mus. Zool., Avd. 37), pp. 1–92, 5 pls.

OTTO, A. W.
1821. Conspectus animalium quorundam maritimorum nondum editorum.

PFEFFER, GEORG
1881. Die Panzerkrebse des Hamburger Museums. Verh. Naturw. Ver. Hamburg, vol. 5, pp. 22–55.

RANDALL, J. W.
1839. Catalogue of the Crustacea brought by Thomas Nuttall and J. K. Townsend, from the west coast of North America and the Sandwich Islands, with descriptions of such species as are apparently new, among which are included several species of different localities, previously existing in the collection of the Academy. Journ. Acad. Nat. Sci. Philadelphia, vol. 8, pp. 106–147, 5 pls.

RATHBUN, MARY J.
1893. Descriptions of new genera and species of crabs from the west coast of North America and the Sandwich Islands. Proc. U.S. Nat. Mus., vol. 16, pp. 223–260.
1898. The Brachyura of the biological expedition to the Florida Keys and the Bahamas in 1893. Bull. Lab. Nat. Hist. State Univ. Iowa, vol. 4, pp. 250–294, 9 pls.
1901. The Brachyura and Macrura of Porto Rico. Bull. U.S. Fish Comm., vol. 20, pt. 2, pp. 1–127, 26 figs., 2 pls.
1914. New genera and species of American brachyrhynchous crabs. Proc. U.S. Nat. Mus., vol. 47, pp. 117–129, 5 figs., 10 pls.
1930. The cancroid crabs of America of the families Euryalidae, Portunidae, Atelecyclidae, Cancridae and Xanthidae. U.S. Nat. Mus. Bull. 152, xvi+609 pp., 85 figs., 230 pls.
1937. The oxystomatous and allied crabs of America. U.S. Nat. Mus. Bull. 166, vi+278 pp., 47 figs., 86 pls.

RISSO, A.
1816. Histoire naturelle des crustacés des environs de Nice, 175 pp., 3 pls.

SAUSSURE, H. DE.
1858. Mémoire sur divers crustacés nouveaux des Antilles et du Mexique. Mém. Soc. Hist. Nat. Genève, vol. 14, pp. 417–496, 6 pls.

SCHMITT, WALDO L.
1926. The macruran, anomuran, and stomatopod crustaceans collected by the American Museum Congo Expedition, 1909–1915: With field notes by Herbert Lang and James P. Chapin. Bull. Amer. Mus. Nat. Hist., vol. 53, pp. 1–67, 75 figs., 9 pls.
1935. Crustacea Macrura and Anomura of Porto Rico and the Virgin Islands. Sci. Surv. Porto Rico and Virgin Is., N.Y. Acad. Sci., vol. 15, pt. 2, pp. 125–227, 80 figs.
1939. Decapod and other Crustacea collected on the Presidential Cruise of 1938 (with introduction and station data). Smithsonian Misc. Coll., vol. 98, no. 6, 29 pp., 2 figs., 3 pls.

SIVERTSEN, E., and HOLTHUIS, L. B.
1956. Crustacea Decapoda (the Penaeidea and Stenopodidea excepted). *In* Rep. Sci. Res. *Michael Sars* North Atlantic Deep-Sea Exped., 1910, vol. 5, no. 12, 56 pp., 32 figs., 4 pls.

SMITH, EDGAR A.
1890. Report on the marine molluscan fauna of the Island of St. Helena. Proc. Zool. Soc. London, 1890, pp. 247–317, 4 pls.

SMITH, SIDNEY I.
1869. Notice of the Crustacea collected by Prof. C. F. Hartt on the coast of Brazil in 1867. Trans. Connecticut Acad. Arts Sci. vol. 2, pp. 1–42, 1 pl.

STEBBING, THOMAS R. R.
1914. Stalk-eyed Crustacea Malacostraca of the Scottish National Antartic Expedition. Trans. Roy. Soc. Edinburgh, vol. 50, pt. 2, pp. 253–307, 10 pls.

STEPHENSEN, K.
1950. Two (sub)tropical crustaceans found north of Thule. *In* Vibe, The marine mammals and the marine fauna in the Thule district. Medd. om Grønland, vol. 150, no. 6, pp. 97–102, 3 figs.

STIMPSON, WILLIAM
1871. Preliminary report on the Crustacea dredged in the Gulf Stream in the Straits of Florida, by L. F. de Pourtales, Assist. U.S. Coast Survey, 1: Brachyura. Bull. Mus. Comp. Zoöl., vol. 2, pp. 109–160.

U.S. GOVERNMENT PRINTING OFFICE: 1966